

## CLAIMS

1. A permanent magnet for a motor, which is disposed in a rotor for the motor and has a cylindrical shape, comprising domains that are magnetized in a radial direction, have aligned magnetizing directions, and are arranged at regular intervals in a circumferential direction,

characterized in that provided that  $D$  represents an inner diameter of the permanent magnet for the motor,  $t$  represents a thickness in the radial direction,  $N$  represents the number of domains, and  $M$  represents the number of AC phases for driving the motor,  $D$  is set to 20 (mm) or smaller and  $t$  is set to satisfy the relation of  $t \leq \pi D / (NM - \pi)$ .

2. The permanent magnet for the motor according to claim 1, characterized in that the permanent magnet for the motor is formed of an Sm-Co based magnetic material.

3. A motor comprising:

a rotor portion including a rotational symmetrical body around which a cylindrical permanent magnet is arranged, and a rotational shaft arranged on an axial line of the rotational symmetrical body;

a stator portion having a plurality of stator coils excitable with AC having  $M$  phases, which are each arranged on an inner circumference or outer circumference of the permanent magnet to face the permanent magnet; and

a bearing portion rotatably and pivotally supporting the rotational shaft to the stator portion so that the rotational symmetric body and the stator coil are concentric to each other, characterized in that:

the permanent magnet includes domains that are magnetized in a radial direction, have aligned magnetizing directions, and are arranged at regular intervals in a circumferential direction; and

provided that  $D$  represents an inner diameter of the permanent magnet,  $t$  represents a thickness in the radial direction,  $N$  represents the number of domains, and  $M$  represents the number of AC phases for driving the motor,  $D$  is set to 20 (mm) or smaller and  $t$  is set to satisfy the relation of  $t \leq \pi D / (NM - \pi)$ .

4. The motor according to claim 3, characterized in that the permanent magnet is formed of an Sm-Co based magnetic material.

5. A magnetizing method for magnetizing a cylindrical permanent magnet disposed to a rotor for the motor so that domains that are magnetized in a radial direction and have aligned magnetizing directions are arranged at regular intervals in a circumferential direction, the permanent magnet being configured so that, provided that  $D$  represents an inner diameter of the permanent magnet,  $t$  represents a thickness in the radial direction,  $N$  represents the number of poles, and  $M$  represents the number of AC phases for driving the motor,  $D$  is set to 20 (mm) or smaller and  $t$  is set to satisfy the relation of  $t \leq \pi D / (NM - \pi)$ ,

the method being characterized by comprising:

a one-direction magnetization step of magnetizing the permanent magnet in one direction which is the radial direction;  
and

a pole magnetization step of magnetizing the permanent magnet magnetized in the one direction in the one-direction magnetization step to domains that inverse the magnetizing direction at regular intervals in the radial direction.

6. The magnetizing method according to claim 5, characterized in that the permanent magnet is formed of an Sm-Co based magnetic material.